

## A Revision of the Japanese Spiders of the Genus *Araniella* (Araneae: Araneidae)

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**Abstract** Japanese spiders of the genus *Araniella* CHAMBERLIN et IVIE, 1942 are revised. Two species of the genus are recognized from the country. One of these is described as a new species under the name *Araniella yaginumai* sp. nov., and the other is identified with *Araniella displicata* (HENTZ, 1847).

The Japanese spider of the Genus *Araniella* CHAMBERLIN et IVIE, 1942 has been wrongly identified with *Araneus westringi* (THORELL, 1856) [= *Araniella displicata* (HENTZ, 1847): YAGINUMA, 1938], *Araneus displicatus* (HENTZ, 1847) [YAGINUMA, 1960; SHINKAI & TAKANO, 1984], or *Araneus cucurbitinus* CLERCK, 1757 [YAGINUMA, 1960]. MATSUDA (1985) pointed out that the feature of the male palp of the species did not agree with the illustrations of those of *Araneus displicatus* and *A. cucurbitinus* made by LOCKET and MILLIDGE (1953). YAGINUMA (1985) agreed with her opinion and treated it as *Araniella* sp. A. On the other hand, Mr. Y. CHIKUNI found another species of the genus from Nagano Prefecture, Japan. YAGINUMA (1985) treated it as *Araniella* sp. B.

After an examination of various specimens, I recognized two species of the genus occurring in Japan. They are identical with YAGINUMA's *Araniella* sp. A and B. Further examination revealed that *Araniella* sp. A is new to science, and it will be described in this paper. As for *Araniella* sp. B, I came to the conclusion that it is identical with *Araniella displicata* (HENTZ, 1847). It will be redescribed in the present paper.

All the type specimens designated in this paper are deposited in the collection of National Science Museum (Natural History), Tokyo.

Before going further, I wish to express my hearty thanks to the late Dr. Takeo YAGINUMA, Osaka, for valuable information. I am deeply indebted to Dr. Hirotsugu ONO, National Science Museum (Natural History), Tokyo, for his constant guidance and revising the manuscript of this paper, and to Dr. Herbert W. LEVI, Museum of Comparative Zoology, Harvard University for loaning valuable specimens. My sincere thanks are also due to Dr. Takahide KAMURA, Otemon Gakuin University, Dr. Nobuo TSURUSAKI, Tottori University, Ms. Sachiko TAZOE, Yokohama, Mr. Ken-ichi KUMADA, Mie, Mr. Takehisa HIRAMATSU, Saitama, Mr. Mitsuru BAN,

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Accepted July 18, 1995

Kawasaki, and Mr. Tomoyuki KIMURA, Kawasaki, for their offering various specimens used in this study.

Following abbreviations are used in this paper: MCZ, Museum of Comparative Zoology, Harvard University; NSMT, National Science Museum (Natural History), Tokyo.

### Genus *Araniella* CHAMBERLIN et IVIE, 1942

*Araniella* CHAMBERLIN et IVIE, 1942, p. 76 (type species: *Epeira displicata* HENTZ, 1847).—LEVI, 1974, p. 292.—LEVY, 1987, p. 243.

**Diagnosis.** *Araniella* can be separated from *Araneus* and *Neoscona* by the following features. Abdomen has no folium pattern, but has paired black spots. The patella of the male palp has three macrosetae. The median apophysis of the male palp is hook-shaped.

**Description.** Carapace longer than wide. Median ocular area longer than wide, wider in front than behind. Chelicera with 3–4 promarginal and 3 retro-marginal teeth. Labium wider than long. Sternum longer than wide. Patella of the male palp with three macrosetae. Median apophysis of the male palp hook-shaped. Abdomen longer than wide, usually with paired black spots. Epigynum with wrinkled scape.

**Species.** Including a new species described in this paper, nine species are known under this genus. Of these, *A. displicata* (HENTZ, 1847) occurs in the Holarctic region. Remaining eight species occur in the Palearctic region. Two species are known from Japan.

### Key to the Japanese Species

- |                                                                               |    |
|-------------------------------------------------------------------------------|----|
| 1. Female .....                                                               | 2. |
| — Male .....                                                                  | 3. |
| 2. Scape of epigynum wider than long (Figs. 8–9) .....                        |    |
| ..... <i>Araniella yaginumai</i> sp. nov.                                     |    |
| — Scape of epigynum longer than wide (Fig. 14) .....                          |    |
| ..... <i>Araniella displicata</i> (HENTZ, 1847).                              |    |
| 3. Conductor of palp with two large knife-shaped appendixes (Figs. 5–6) ..... |    |
| ..... <i>Araniella yaginumai</i> sp. nov.                                     |    |
| — Conductor without such appendix (Figs. 12–13) .....                         |    |
| ..... <i>Araniella displicata</i> (HENTZ, 1847).                              |    |

### *Araniella yaginumai* sp. nov.

(Figs. 1–9)

*Araneus westringi*: YAGINUMA, 1938, p. 8 [nec *A. westringi* (THORELL, 1856)].

*Araneus cucurbitinus*: YAGINUMA, 1960, p. 55, pl. 20, fig. 122; 1970, p. 656; 1977, p. 385 [nec *A. cucurbitinus* CLERCK, 1758].

*Araneus displicatus*: YAGINUMA, 1960, p. 55, pl. 20, fig. 123; 1970, p. 656; 1977, p. 385 [nec *A. displicatus* (HENTZ, 1847)].

*Araniella* sp.: MATSUDA, 1984, p. 30.—YAGINUMA *et al.*, 1990, p. 258.



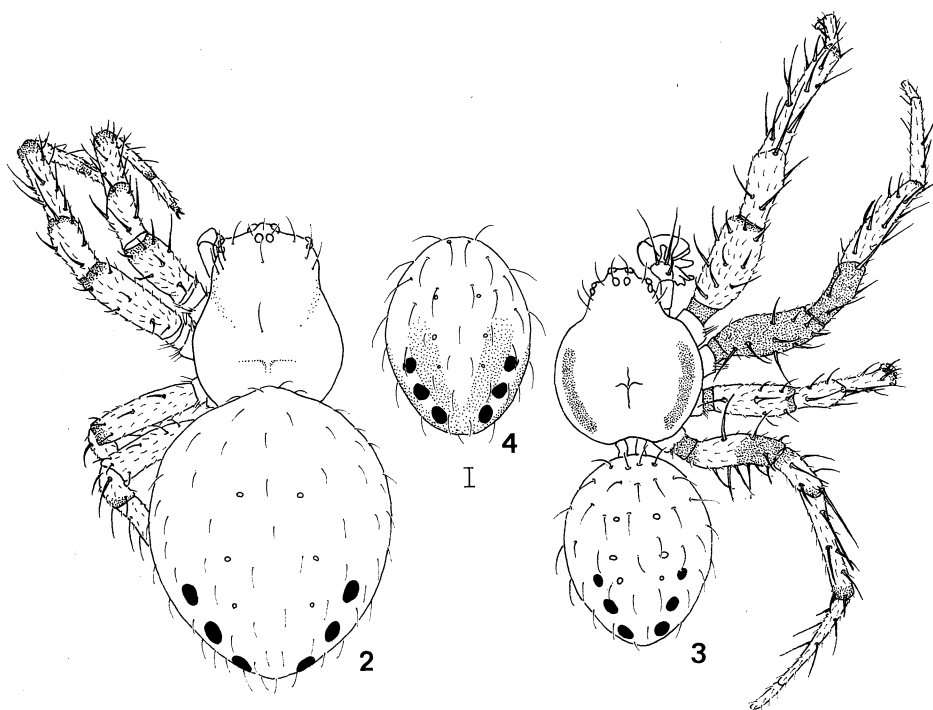
Fig. 1. *Araniella yaginumai* sp. nov., female on a wheat head.

*Araniella* sp. A: YAGINUMA, 1985, p. 128; 1986, p. 102, fig. 54, pl. 24, fig. 7. — CHIKUNI, 1989, pp. 69, 208, fig. 25.

*Specimens examined.* Type series. Holotype: ♂, Ashiu, Miyama-chô, Kitakuwata-gun, Kyoto Pref., 27-V-1979, T. KAMURA leg. (NSMT-Ar 3230). Paratypes: 1♂, Shihorokôgen-dôro, Kamishihoro-chô, Hokkaido, 24-VI-1990, M. MATSUDA leg. (NSMT-Ar 3231); 1♂, Nukabira, Kamishihoro-chô, Hokkaido, 15-VI-1985, M. MATSUDA leg. (NSMT-Ar 3232); 1♀, Katashina-mura, Tone-gun, Gunma Pref., 3-5-VII-1982, A. TANIKAWA leg. (NSMT-Ar 3233); 1♀, Fudakake, Tanzawa, Kanagawa Pref., 17-VI-1990, A. TANIKAWA leg. (NSMT-Ar 3234); 1♂, Mt. Kôbôyama, Hadano-shi, Kanagawa Pref., 3-V-1983, A. TANIKAWA leg. (NSMT-Ar 3235); 1♀, 8-VII-1982, 1♀, 29-V-1982, Mt. Taikoyama, Yasaka-chô, Takeno-gun, Kyoto Pref., T. KAMURA leg. (NSMT-Ar 3236-3237); 1♂, Ashiu, Miyama-chô, Kitakuwata-gun, Kyoto Pref., 25-V-1980, T. KAMURA leg. (NSMT-Ar 3238); 1♀, Aou, Ôtoyo-chô, Nagaoka-gun, Kochi Pref., 30-IV-1994, T. HIRAMATSU leg. (NSMT-Ar 3239).

*Other specimens examined.* 1♂, Oniwaki, Rishiri-chô, Rishiri-gun, Hokkaido, 12-VII-1990, K. KUMADA, leg.; 2♀♀, Shari-chô, Shari-gun, Hokkaido, 10-VIII-1992, S. TAZOE leg.; 3♀♀, Lake Akanko, Akan-gun, Hokkaido, 12-VIII-1992, S. TAZOE leg.; 1♀, Tsurugaoka, Kushiro-shi, Hokkaido, 15-VII-1977, K. KUMADA leg.; 1♂, 17-VI-1985, 1♀1♂, 13-VI-1986, Mt. Monbetsuyama, Monbetsu-shi,

Hokkaido, N. TSURUSAKI leg.; 4♂♂1♀, 15-VI-1985, 2♀♀, 3-VII-1985, Nukabira, Kamishihoro-chô, Katô-gun, Hokkaido, 15-VI-1985, M. MATSUDA leg.; 1♂2♀♀, Higashi-oribe, Kamishihoro-chô, Katô-gun, Hokkaido, 10-VII-1993, M. MATSUDA leg.; 1♀, Lake Hatoriko, Iwase-gun, Fukushima Pref., 24-VI-1990, A. TANIKAWA leg.; 1♀, Ôkizawa, Shirakawa-shi, Fukushima Pref., 24-VI-1990, A. TANIKAWA leg.; 4♀♀, 3-5-VII-1981, 1♂1♀, 2-VIII-1987, Katashina-mura, Tone-gun, Gunma Pref. A. TANIKAWA leg.; 1♀, same place, 3-VIII-1985, Y. HORI leg., 1♀, Kôtokuji, Itsukaichi-shi, Tokyo, 15-VII-1985, K. KUMADA leg.; 1♀, Kôtakuji, Isehara-shi, Kanagawa Pref., 9-VII-1979, K. KUMADA leg.; 1♂, Mt. Kôbôyama, Hadano-shi, Kanagawa Pref., 3-V-1983, A. TANIKAWA leg.; 1♂, Lake Ashinoko, Ashigarashimo-gun, Kanagawa Pref., M. BAN leg.; 1♀, 28-VII-1980, 1♀, 29-VII-1980, 2♀♀, 2-VIII-1981, 1♀, 23-VII-1988, Sugadaira, Chisagata-gun, Nagano Pref., A. TANIKAWA leg.; 1♀, same place, 28-VII-1980, T. UENO leg.; 1♀, same place, 23-VII-1984, Y. HORI leg.; 1♀, Mt. Nekodake, Chisagata-gun, Nagano Pref., 22-VII-1984, Y. HORI leg.; 1♂, Yunomaru, Chisagata-gun, Nagano Pref., 6-VIII-1983, A. TANIKAWA leg.; 1♀, same place, 7-VIII-1983, K. SATO leg.; 1♂, Enrei-kôgen, Shiojiri-shi, Nagano Pref., 5-VI-1986, K. KUMADA leg.; 1♂, Kamikôchi, Minamiazumi-gun, Nagano Pref., 2-VIII-1991, S. TAZOE leg.; 1♂, 27-V-1979, 1♂2♀♀, 24-V-1981, Ashiu, Miyama-chô, Kitakuwata-gun, Kyoto Pref., T. KAMURA leg.; 1♀, Sasari, Miyama-



Figs. 2-4. *Araniella yaginumai* sp. nov.—2. Female, dorsal view (paratype, NSMT-Ar 3237). 3. Male, dorsal view (paratype, NSMT-Ar 3238). 4. Male abdomen, dorsal view (holotype, NSMT-Ar 3230). (Scales: 0.25 mm.)

chô, Kitakuwata-gun, Kyoto Pref., 26-V-1980, T. KAMURA leg.; 1♂, Hirogawara, Sakyô-ku, Kyoto-shi, Kyoto Pref., 25-V-1981, T. KAMURA leg.; 1♀, Mt. Taikoyama, Yasaka-chô, Takeno-gun, Kyoto Pref., 28-V-1982, T. KAMURA leg.; 1♀, Segawa, Minô-shi, Osaka Pref., 8-V-1977, T. KAMURA leg.; 1♂, Ôtoyo-chô, Nagaoka-gun, Kochi Pref., 1-V-1994, T. HIRAMATSU leg.

*Description* [based on the ♂ holotype and 1♀ paratype from Kyoto (NSMT-Ar 3237); variations are given in the parentheses]. Measurement (in mm). Total length ♂ 5.00 (4.10–5.36), ♀ 6.37 (4.89–7.92); carapace length ♂ 2.41 (2.16–2.50), ♀ 2.66 (2.37–2.83); width ♂ 1.96 (1.80–2.05), ♀ 2.01 (1.96–2.20); abdomen length ♂ 2.74 (2.13–3.00), ♀ 4.30 (2.97–5.88), width ♂ 1.93 (1.64–2.40), ♀ 3.28 (2.10–4.88). Length of legs of the holotype ♂ and paratype 1♀ from Kyoto (NSMT-Ar 3237) as shown in Table 1.

Table 1. Measurement of leg segments of *Araniella yaginumai* sp. nov. (in mm; ♂/♀).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.64/0.70	1.63/1.71	1.75/1.60	1.05/1.06	2.31/2.07	7.38/7.14
II	0.70/0.69	1.70/1.60	1.45/1.43	0.98/1.00	2.20/2.00	7.03/6.72
III	0.60/0.56	1.15/1.01	0.95/0.87	0.65/0.73	1.68/1.44	5.03/4.61
IV	0.63/0.61	1.78/1.61	1.50/1.42	0.80/0.91	2.18/1.93	6.89/6.49

Male. Carapace length / width 1.23 (1.18–1.23), median ocular area length / width 1.07 (1.07–1.19), anterior width / posterior width 1.10 (1.00–1.11). Chelicera with 3 (3–4) promarginal and 3 retromarginal teeth. Labium length / width 0.67 (0.46–0.69); sternum length / width 1.20 (1.12–1.23). Length of leg I / carapace 3.06 (2.87–3.19). Male palp: Conductor with two large knife-shaped appendixes (Fig. 5) (shape somewhat varied, as in Fig. 6). Abdomen length / width 1.42 (1.25–1.42).

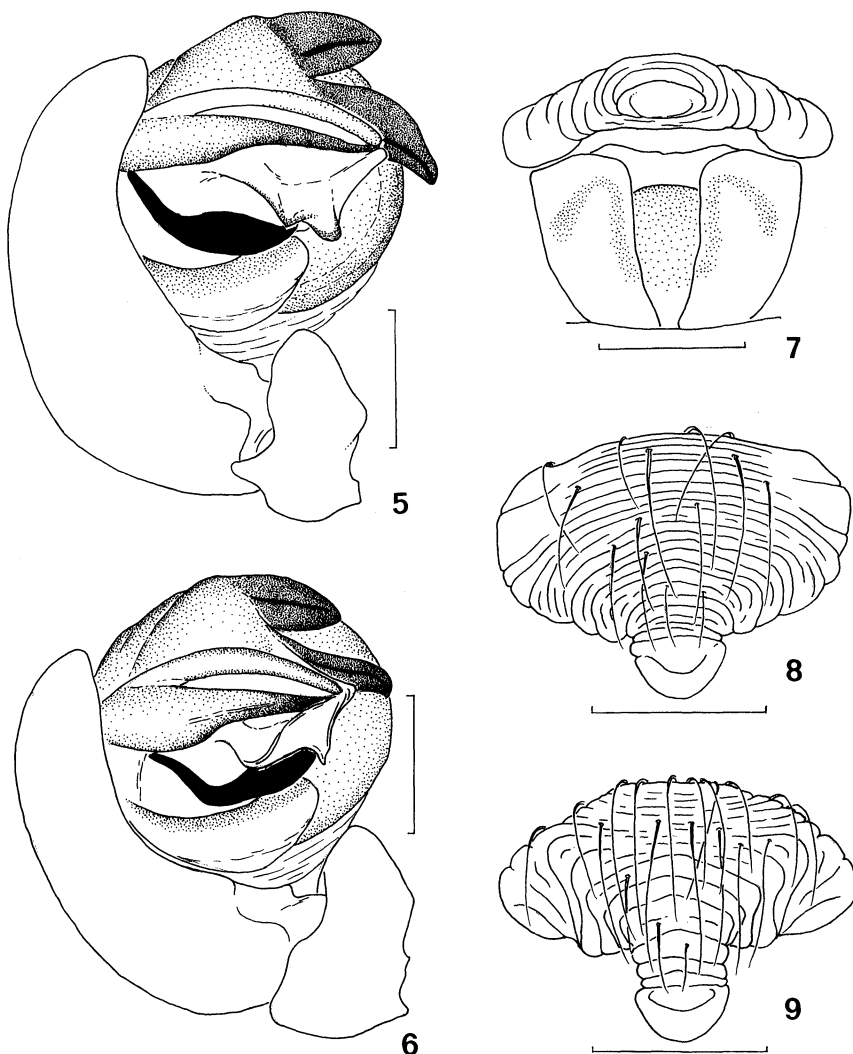
Female. Carapace length / width 1.32 (1.21–1.36), median ocular area length / width 1.09 (1.06–1.13), anterior width / posterior width 1.02 (1.02–1.14). Chelicera with 4 promarginal and 3 retromarginal teeth. Labium length / width 0.69 (0.58–0.69); sternum length / width 1.15 (1.10–1.15). Length of leg I / carapace 2.68 (2.68–2.96). Abdomen length / width 1.31 (1.20–1.41). Female genitalia (Figs. 7–9): Scape of epigynum much wrinkled, wider than long.

Coloration and markings in alcohol. Male: Carapace pale brown, thoracic part marginated with dark brown (sometimes not marginated). Legs: 1st trochanter, 2nd patella, femur and trochanter, 3rd trochanter, 4th trochanter and distal half of 4th femur dark brown (sometimes distal half of 3rd femur also dark brown); other parts pale brown. Abdomen pale yellow, with 3 (2–4) pairs of black spots (sometimes uneven number) and indistinct V-shaped dark colored marking (Fig. 4) (rarely not, as in Fig. 3).

Female: Carapace pale brown. Legs pale brown, distal end of each segment darkened (rarely not darkened). Abdomen pale yellow with 3 (1–4) pairs of black spots (Fig. 2) (sometimes uneven number).

*Range.* Japan (Hokkaido, Honshu, Shikoku).

*Remarks.* This new species can be easily distinguished from the other species of the genus by the shape of the male palp. The diagnostic character is the con-



Figs. 5–9. *Araniella yaginumai* sp. nov.—5. Male palp, mesal view (holotype, NSMT–Ar 3230). 6. Same (paratype, NSMT–Ar 3232). 7. Epigynum, posterior view (paratype, NSMT–Ar 3237). 8. Epigynum, ventral view (paratype, NSMT–Ar 3236). 9. Same (paratype, NSMT–Ar 3233). (Scales: 0.25 mm.)

ductor which has two large knife-shaped appendixes (Figs. 5–6).

*Etymology.* This species is dedicated to the late Dr. Takeo YAGINUMA, Osaka.

***Araniella displicata* (HENTZ, 1847)**

(Figs. 10–16)

*Epeira displicata* HENTZ, 1847, p. 476, pl. 31, fig. 17 (types from Alabama, destroyed).

*Aranea displicata*: WIEHLE, 1931, p. 109, figs. 167–170.

*Araniella displicata*: CHAMBERLIN & IVIE, 1942, p. 76.—LEVI, 1974, p. 294.—BLANKE, 1982, p. 287, figs. 1–2.—ROBERTS, 1985, p. 216, fig. 97e.

*Araneus displicatus*: LOCKET & MILLIDGE, 1953, p. 149, figs. 96B, 97C, 99C, 100C, E.

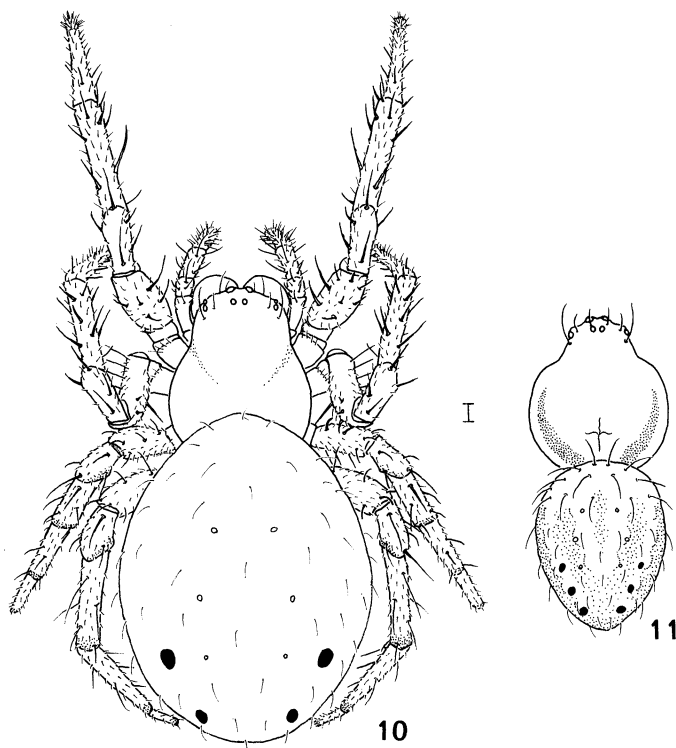
*Araniella* sp. B: YAGINUMA, 1985, p. 128, figs. 6C–D.—CHIKUNI, 1989, pp. 69, 208, fig. 26.

Further literature see LEVI (1974).

*Specimens examined.* JAPAN: 1♀, Maruyama, Kamishihoro-chô, Katô-gun, Hokkaido, 24–25–VIII–1991, M. KAWABE leg.; 1♀, Nukabira, Kamishihoro-chô, Katô-gun, Hokkaido, ?–VII–1988, M. MATSUDA leg.; 2♀♀, Katashina-mura, Tone-gun, Gunma Pref., 2–VIII–1987, A. TANIKAWA leg.; 1♀, Sugadaira, Chîsagata-gun, Nagano Pref., 27–VII–1980, M. MORI leg.; 1♀, same place, 28–VII–1980, A. UYEMURA leg.; 2♀♀, 2–VIII–1981, 2♀♀, 24–VII–1988 (NSMT–Ar 3240), 1♂, 23–VII–1988 (NSMT–Ar 3241), 1♂, 26–VII–1988 (NSMT–Ar 3242), same place, A. TANIKAWA leg.; 2♀♀, 25–VII–1988 (NSMT–Ar 3243), 1♀, 22–VII–1984 (NSMT–Ar 3244), Mt. Nekodake, Chîsagata-gun, Nagano Pref., A. TANIKAWA leg.

CANADA: 1♀, Yoho Lake, British Columbia, 5–VIII–1989, A. TANIKAWA leg.

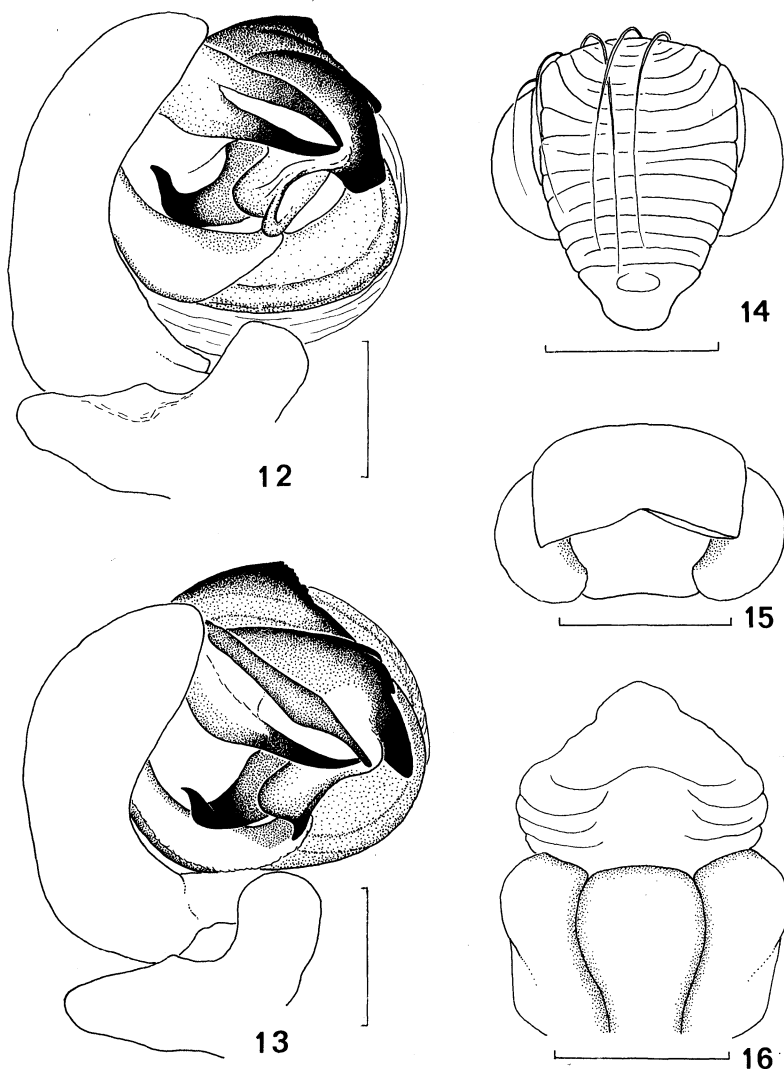
U.S.A.: 1♀, 14–VI–1982, 1♀, 17–VI–1982, 1♂, 20–VII–1982, Call Creek,



Figs. 10–11. *Araniella displicata* (HENTZ, 1847).—10. Female, dorsal view (NSMT–Ar 3240). 11. Male carapace and abdomen, dorsal view (NSMT–Ar 3221). (Scales: 0.25 mm.)

Malheur Natl. Forest, Oregon, FICHTER & MOLDENKE leg. (MCZ); 3♂♂2♀♀, Picnic area near Kitt Peak Observatory, Baboquivari Mts., Pima Co., Arizona, 20-VI-1985, W. MADDISON leg. (MCZ).

*Description* (based on Japanese specimens). Measurement (in mm). Body length ♂ 4.30–4.40, ♀ 5.83–7.42; carapace length ♂ 2.11–2.20, ♀ 2.30–3.08, width



Figs. 12–16. *Araniella displicata* (HENTZ, 1847).—12. Male palp, mesal view (NSMT–Ar 3241). 13. Same, from a little different angle. 14. Epigynum with scape, ventral view (NSMT–Ar 3240). 15. Epigynum, scape torn off, ventral view (NSMT–Ar 3244). 16. Epigynum with scape, posterior view (NSMT–Ar 3243). (Scales: 0.25 mm.)



Table 2. Measurement of leg segments of *Araniella displicata* (HENTZ, 1847) (in mm; ♂/♀).

Leg	Tarsus	Metatarsus	Tibia	Patella	Femur	Total
I	0.63/0.70	1.50/1.75	1.65/1.60	0.98/1.04	2.20/2.10	6.96/7.18
II	0.66/0.70	1.56/1.58	1.35/1.40	0.85/0.95	2.10/2.03	6.52/6.66
III	0.60/0.58	1.05/1.03	0.89/0.85	0.63/0.73	1.55/1.45	4.72/4.64
IV	0.63/0.64	1.63/1.65	1.40/1.40	0.75/0.90	2.04/2.00	6.45/6.59

♂ 1.84–1.91, ♀ 1.78–2.40; abdomen length ♂ 2.18–2.40, ♀ 4.20–5.47, width ♂ 1.71–1.73, ♀ 3.50–4.29. Length of legs of 1♂ (NSMT-Ar 3241) and 1♀ (NSMT-Ar 3240) from Nagano as shown in Table 2.

Male. Carapace length / width 1.14–1.15; median ocular area length / width 1.08–1.10, anterior width / posterior width 1.08–1.17. Chelicera with 4 promarginal and 3 retromarginal teeth. Labium length / width 0.40–0.52; sternum length / width 1.17–1.19. Length of leg I / carapace 3.09–3.16. Male palp as shown in Figs. 12–13. Abdomen length / width 1.27–1.39.

Female. Carapace length / width 1.22–1.30, median ocular area length / width 1.06–1.14, anterior width / posterior width 1.05–1.15. Chelicera with 4 promarginal and 3 retromarginal teeth. Labium length / width 0.59–0.66; sternum length / width 1.07–1.16. Length of leg I / carapace 2.54–3.03. Abdomen length / width 1.19–1.32. Female genitalia (Figs. 14–16): Scape of epigynum wrinkled, longer than wide.

Coloration and markings in alcohol. Male. Carapace pale brown, thoracic part margined with dark brown (Fig. 11). Legs pale brown, each segment darkened distally. Abdomen pale yellow, with 3 pairs of black spots and indistinct V-shaped dark colored marking (Fig. 11).

Female. Carapace, legs pale brown. Abdomen pale yellow with 2–4 pairs of black spots (Fig. 10).

Range. Holarctic.

## 摘 要

日本産 *Araniella* ムツボシオニグモ属のクモ類について検討した結果、2種の生息を再確認した。この2種は八木沼(1985)や千国(1989)によって *Araniella* sp. A ムツボシオニグモおよび *Araniella* sp. B ムツボシオニグモの1種とされたものであった。このうち *Araniella* sp. A とされていたものは、新種と認められたので *Araniella yaginumai* sp. nov. ムツボシオニグモと命名して記載した。また、*Araniella* sp. B は、*Araniella displicata* (HENTZ, 1847) トガリハナオニグモに再同定した。ムツボシオニグモという和名は誤同定の結果として *Araniella displicata* に対して使用されたこともあったが、現在この和名は *Araniella yaginumai* sp. nov. にあたるクモに対して広く使用されているので、*Araniella yaginumai* sp. nov. の和名をムツボシオニグモとしたい。また、*Araniella displicata* (HENTZ, 1847) の和名には、吉倉によって最初に使用されたトガリハナオニグモ(八木沼, 1985)を再使用したい。

## References

- BLANKE, R., 1980. Die systematische Stellung von *Araneus cucurbitinus maderianus* KULCZYŃSKI 1905 [sic] (Arachnida: Araneae). *Senckenbergiana biol.*, **61**: 97–102.
- 1982. Untersuchungen zur Taxonomie der Gattung *Araniella* (Araneae, Araneidae). *Zool. Scripta*, **11**: 287–305.
- BONNET, P., 1956. *Bibliographia Araneorum*, **2**(2), pp. 919–1926. Toulouse.
- BRIGNOLI, P. M., 1983. A Catalogue of the Araneae Described between 1940 and 1981, 755 pp. Manchester University Press, Manchester and New York.
- CHAMBERLIN, R. V., & W. IVIE, 1942. A hundred new species of American spiders. *Bull. Univ. Utah (Biol.)*, **32**: 1–117.
- CHIKUNI, Y., 1989. Pictorial Encyclopedia of Spiders in Japan. 308 pp. Kaisei-sha, Tokyo.
- CHRYSANTHUS, O. F. M., 1955. Notes on spiders I. *Entmol. Ber.*, **15**: 301–302.
- CLERCK, C., 1758 [1757]. *Aranei Suecici, descriptionibus et figuris oeneis illustrati, ad genera subalterna redacti speciebus ultra LX determinati*. 154 pp, 6 pls. Stockholm.
- HENTZ, N. M., 1847. Descriptions and figures of the Araneides of the United States. *Boston J. nat. Hist.*, **5**: 443–478.
- LEVI, H. W., 1974. The orb-weaver genera *Araniella* and *Nuctenea* (Araneae: Araneidae). *Bull. Mus. comp. Zool.*, **146**: 291–316.
- LEVY, G., 1987. Spiders of the genera *Araniella*, *Zygiella*, *Zilla* and *Mangora* (Araneae, Araneidae) from Israel, with notes on *Metellina* species from Lebanon. *Zool. Scripta*, **16**: 243–257.
- LOCKET, G. H., & A. F. MILLIDGE, 1953. British Spiders, Vol. II. 449 pp. Ray Society, London.
- MATSUDA, M., 1985. A list of the spiders of the central mountain district (Taisetsuzan National Park), Hokkaido. *Bull. Higashi Taisetsu Mus. Nat. Hist.*, **7**: 1–33. (In Japanese with English abstract.)
- PLATNICK, N. I., 1989. Advances in Spider Taxonomy 1981–1987. 673 pp. Manchester University Press, Manchester & New York.
- 1993. Advances in Spider Taxonomy 1988–1991. 846 pp. New York Entomological Society & The American Museum of Natural History, New York.
- ROBERTS, M. J., 1985. The Spiders of Great Britain and Ireland. 229 pp. Harley Books, Colchester.
- SACHER, P., 1990. Untersuchungen über Zahl, Anordnung und taxonomischen Wert der dorso-lateralen Abdominalpunkte in der Gattung *Araniella* (Arachnida: Araneidae). *Acta zool. Fennica*, **190**: 345–349.
- SHINKAI, E., & S. TAKANO, 1984. A Field Guide to the Spiders of Japan. 206 pp. Tokai Univ. Press, Tokyo. (In Japanese.)
- THORELL, T., 1856. *Revisio critica Araneorum Suecicarum, quas descripserunt Clerckius, Linnaeus, de Geerus*. *N. Act. reg. Soc. sci. Upsal.*, **2**: 61–176 (not seen).
- WIEHLE, H., 1931. Spinnentiere oder Arachnoidea. VI. 27. Familie. Araneidae. *In Tierw. Deutschl.*, (23), pp. 1–136. Gustav Fischer, Jena.
- YAGINUMA, T., 1938. A provisional list of spiders from Osaka Prefecture, Japan. *Acta arachnol.*, **3**: 2–14. (In Japanese.)
- 1960. Spiders of Japan in Colour. 186 pp., 56 pls. Hoikusha, Osaka. (In Japanese.)
- 1970. The spider fauna of Japan (revised in 1970). *Bull. natn. Sci. Mus., Tokyo*, **13**: 639–701. (In Japanese with English summary.)
- 1977. A list of Japanese spiders (revised in 1977). *Acta arachnol.*, **27** (spec. no.): 367–406. (In Japanese with English synopsis.)
- 1985. Taxonomic notes on some Japanese spiders. *Fac. Let. Rev. Otemon Gakuin Univ.*, **19**: 121–134. (In Japanese.)
- 1986. Spiders of Japan in Color (n. ed.). 305 pp., 64 pls. Hoikusha, Osaka. (In Japanese.)
- , Y. HIRASHIMA & C. OKUMA, 1990. Spiders, Etymology of their Scientific and Japanese Names. 287 pp. Kyushu Univ. Press, Fukuoka. (In Japanese.)